5.7 GREENHOUSE GAS EMISSIONS

This section summarizes the existing conditions, describes the regulatory framework, and discusses potential impacts with regards to greenhouse gas emissions as a result of implementation of the proposed project. The following document was used to analyze the potential impacts from the proposed project:

- *Global Climate Change, Quarry Creek Mixed Use Development*, Ldn Consulting, Inc. (Appendix K of this EIR).

The technical appendices are included on the attached CD found on the back cover of this EIR.

5.7.1 Existing Conditions

Global Climate Change

Global Climate Change (GCC) is a change in the average weather of the earth that is measured by temperature, wind patterns, precipitation, and storms over a long period of time. The baseline, against which these changes are measured, originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate is continuously changing, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. However, scientists have observed an unprecedented acceleration in the rate of warming during the past 150 years. GCC is a documented effect. Although the degree to which the change is caused by anthropogenic (man-made) sources is still under study, the increase in warming has coincided with the global industrial revolution, which has seen the widespread reduction of forests to accommodate urban centers, agriculture, and the use of fossil fuels – primarily the burning of coal, oil, and natural gas for energy. The majority of scientists agree that anthropogenic sources are a main, if not primary, contributor to the GCC warming. Effects of climate change include effects to public health, wildfires, water supply, agriculture, ecosystems, and rising sea levels.

Greenhouse Gases

Gases that absorb and re-emit infrared radiation in the atmosphere are called greenhouse gases (GHG), in reference to the fact that greenhouses retain heat. Common GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases, and ozone (O_3). Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Man-made GHGs, many of which have greater heat-absorption potential than CO_2, include fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

The accumulation of GHG in the atmosphere regulates earth's temperature. Without the natural heat trapping effect of GHG, earth's surface would be about 34° Centigrade (C) cooler. However, it is believed that emissions from human activities, particularly the consumption of fossil fuels for electricity production and transportation, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations. A detailed discussion of the primary GHGs of concern

and the effects of GCC on the environment is provided in the Global Climate Change Study (Appendix K of this EIR).

5.7.2 Regulatory Setting

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 (P.L. 110-140, H.R. 6) is an energy policy law adopted by congress, which consists mainly of provisions designed to increase energy efficiency and the availability of renewable energy. The law requires automakers to boost fleet wide gas mileage averages from the current 25 mpg to 35 mpg by 2020, which will reduce energy needs by 28.5 percent. This fleet wide average is known as the Corporate Average Fuel Economy (CAFE) standard.

CAFE Standards are similar to requirements developed within Assembly Bill (AB) 1493 regulations; however, would not reduce greenhouse gas levels as quickly. The United States Environmental Protection Agency (U.S. EPA) denied the state of California from implementing AB 1493.

Global Warming Solutions Act of 2006 (Assembly Bill 32)

The Global Warming Solutions Act of 2006 (AB 32) requires that by 2020 the state's greenhouse gas emissions be reduced to 1990 levels or roughly a 28.3 percent reduction. Significance thresholds have not been adopted but are currently being discussed. AB 32 is specific as to when thresholds shall be defined. The pertinent Sections are referenced within Part 4 of AB 32 titled *Greenhouse Gas Emissions Reductions* are shown below:

Section 38560.5 (b) states:

On or before January 1, 2010, the state board shall adopt regulations to implement the measures identified on the list published pursuant to subdivision (a).

Section 38562 states:

(A) On or before January 1, 2011, the state board shall adopt greenhouse gas emission limits and emission reduction measures by regulation to achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions in furtherance of achieving the statewide greenhouse gas emissions limit, to become operative beginning on January 1, 2012.

(B) In adopting regulations pursuant to this Section and Part 5 (commencing with Section (38570), to the extent feasible and in furtherance of achieving the statewide greenhouse gas emissions limit, the state board shall do all of the following:

1. Design the regulations, including distribution of emissions allowances where appropriate, in a manner that is equitable, seeks to minimize costs and maximize the total benefits to California, and encourages early action to reduce greenhouse gas emissions.
2. Ensure that activities undertaken to comply with the regulations do not disproportionately impact low-income communities.
3. Ensure that entities that have voluntarily reduced their greenhouse gas emissions prior to the implementation of this Section receive appropriate credit for early voluntary reductions.

4. Ensure that activities undertaken pursuant to the regulations complement, and do not interfere with, efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions.
5. Consider cost-effectiveness of these regulations.
6. Consider overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health.
7. Minimize the administrative burden of implementing and complying with these regulations.
8. Minimize leakage.
9. Consider the significance of the contribution of each source or category of sources to statewide emissions of greenhouse gases.

(C) In furtherance of achieving the statewide greenhouse gas emissions limit, by January 1, 2011, the state board may adopt a regulation that establishes a system of market-based declining annual aggregate emission limits for sources or categories of sources that emit greenhouse gas emissions, applicable from January 1, 2012, to December 31, 2020, inclusive, that the state board determines will achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions, in the aggregate, from those sources or categories of sources.

(D) Any regulation adopted by the state board pursuant to this part or Part 5 (commencing with Section 38570) shall ensure all of the following:

1. The greenhouse gas emission reductions achieved are real, permanent, quantifiable, verifiable, and enforceable by the state board.
2. For regulations pursuant to Part 5 (commencing with Section 38570), the reduction is in addition to any greenhouse gas emission reduction otherwise required by law or regulation, and any other greenhouse gas emission reduction that otherwise would occur.
3. If applicable, the greenhouse gas emission reduction occurs over the same time period and is equivalent in amount to any direct emission reduction required pursuant to this division.

Senate Bill 97 (SB 97)

SB 97 requires the Office of Planning and Research (OPR) to prepare and transmit to the Resources Agency, guidelines and directed amendments to the California Environmental Quality Act (CEQA) statute specifically for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions.

Assembly Bill 1493 (Pavley Standards)

AB 1493 was California's first bill which was approved by the Governor in 2002 and was designed to reduce greenhouse gases within the state of California. It required the State Board to develop and adopt motor vehicle regulations to cost effectively reduce greenhouse gasses by January 1, 2005 and start enforcing them a year later. Furthermore, the state board shall develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles. AB 1493 regulations are similar to CAFE Standards; however, they are expected to produce a greenhouse gas benefit greater to that of the CAFE Standard and would be expected to double the amount of GHGs

saved under CAFE. The Pavley rules, also referred to as California Standards, are designed to regulate GHG emissions while the federal standards are aimed at reducing the nation's fuel consumption.

Under Pavley, starting with vehicles produced in 2009, manufactures have the flexibility in meeting California standards through a combination of reducing tailpipe emissions of carbon dioxide, nitrous oxide, methane and hydrofluorocarbons from vehicle air conditions systems. Furthermore, the California standards are estimated to increase fuel efficiency to 43 miles per gallon by 2020. The 2020 reductions are based on a more stringent emission limit than the current California Standards, called the Pavley 2 Rule, as set forth in the California Climate Action Plan and committed to by the ARV in its Early Action Measures under AB 32. California Air Resources Board (CARB) staff recommends through example the use of more stringent emission reduction beginning in 2017 as well as applying more stringent standards through 2020.[1]

The Global Climate Change Study utilized a baseline year of 2002 and calculated cumulative baseline equivalent GHG Reductions based on Pavley standards. One conclusion of the study finds that Pavley reductions are as high as 20 percent from 2002 levels. Also, it should be noted that reductions under Pavley were not assumed from 2002 through 2008. In 2009 Pavley regulations went into effect and become more stringent with time, which will require automobile companies to produce vehicles that generate less GHG emissions each year. The 20 percent reduction is calculated based on the fact that the overall baseline emissions over the 18 years averages out to 496,200 tons per day and cumulative reductions under Pavley reduce up to 100,500 tons per day or a 20 percent reduction.

California State Senate Bill 375 (SB 375)

California State Senate Bill (SB) 375 was signed into law in 2008 and is intended to provide a means for achieving AB 32 Greenhouse Gas Emissions target reduction goals from cars and light trucks through long-range regional growth strategies and transportation plans. SB 375 is directed toward California's 18 Metropolitan Planning Organizations (MPOs). The San Diego Association of Area Governments (SANDAG) is San Diego County's MPO. Under SB 375, each MPO is required to develop a "Sustainable Communities Strategy," a newly required element of the Regional Transportation Plan (RTP). SB 375 does not take over local planning functions, and a Sustainable Community Strategy does not in any way supersede a General Plan, specific plan, or local zoning ordinance. Additionally, SB 375 does not require any consistency between the Sustainable Communities Strategy and these planning and development regulatory documents. However, the MPOs are required to develop the Sustainable Communities Strategies through integrated land use and transportation planning and demonstrate an ability to attain the proposed reduction targets by 2020 and 2035.

Executive Order S-01-07

Executive Order S-01-07 was signed by Governor Arnold Schwarzenegger in January 2007 and is effectively known as the Low Carbon Fuel Standard or LCFS. The executive order seeks to reduce the carbon intensity of California's passenger vehicle fuels by at least 10 percent by 2020. The LCFS will require fuel providers in California to ensure that the mix of fuel they sell into the California market meet, on average, a declining standard for GHG emissions measured in CO_2e grams per unit of fuel energy sold.

[1] Comparison of Greenhouse Gas Reduction for the United States and Canada under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations – 2/2008.

5.7.3 Project Impacts

5.7.3.1 Thresholds of Significance

CEQA Guidelines

As directed by SB 97, the Natural Resources Agency adopted Amendments to Title 14 Division 6 Chapter 3 *CEQA Guidelines* for greenhouse gas emissions on December 30, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations (CCR). The amendments became effective on March 18, 2010. The pertinent Sections are shown below:

Section 15064.4 - Determining the Significance of Impacts from Greenhouse Gas

(A) The determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency consistent with the provisions in Section 15064. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project. A lead agency shall have discretion to determine, in the context of a particular project, whether to:

1. Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use. The lead agency has discretion to select the model or methodology it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; and/or
2. Rely on a qualitative analysis or performance-based standards.

(B) A lead agency should consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

1. The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting.
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
3. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

For purposes of this EIR, a significant greenhouse gas impact would occur if implementation of the proposed project would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or,

- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

California Air Pollution Control Officers Association-Recommended Carbon Dioxide Screening Levels

California Air Pollution Control Officers Association (CAPCOA) and CARB currently publish CO_2 screening levels for use in CEQA reporting. The screening level is set at 900 metric tons (MT) of CO_2 per year and is 'recommended' for all new projects within the State of California for compliance with the intent of AB 32. Operational levels due to a proposed project action above the 900 MT screening value will be subject to additional recommendations for compliance. For example, if a project's estimated CO_2 emissions exceed the 900 MT screening threshold, then mitigation measures would be recommended in order for the project to achieve a reduction of CO_2 emissions by approximately 28 percent as compared to "business-as-usual" (BAU) scenario. BAU is that projected emissions that would have been generated without implementation of regulatory standards under AB 32.

Methodology

Construction Emissions

GHG impacts related to construction were calculated using the latest URBEMIS2007 air quality model, which was developed by the CARB. URBEMIS2007 has been approved by the San Diego Air Pollution Control District (SDAPCD) and the City for estimating construction emission calculations. Additionally, CO_2e emissions generated from blasting will be added to the URBEMIS output. URBEMIS incorporates emission factors from the EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions. Because CO_2 emissions from construction only occur at the beginning of a project, emissions were averaged over a 30-year period. This recommendation was based on proposals from South Coast Air Quality Management District (SCAQMD) in 2008.

Operational Vehicular Emissions

Operational Emissions from daily trips and area sources were calculated utilizing emission levels reported in grams/mile from the EMFAC2007 emission model and were customized to incorporate project specific Vehicle Miles Traveled (VMT). All emission levels were multiplied by the annual mileage and then converted to MTs for typical reporting consistency. The equation below was utilized to determine the MTs:

*GHG (metric tons) = Emission Factor (g/mile) * Annual Mileage * 0.000001 (Metric Ton/g)*

Electric Usage

Utilizing methodologies within the California Climate Action Registry General Reporting Protocol Version 3.1-January 2009 (CCARGRPV3.1) CO_2, CH_4, and N_2O from electricity use can be calculated utilizing equations III.6b which is shown below:

Equation III.6b (GHG = CO_2, or CH_4, or N_2O)

$$GHG\ (metric\ tons) = \frac{Electricity\ Use\ (kWh) * Electricity\ Emission\ Factor\ (lbs\ GHG/kWh)}{2{,}204\ lbs/Metric\ Ton}$$

The electricity emission factors are published within Table C.2 within the CCARGRPV3.1 document and are broken out into sub region. The proposed project is located within California and for CO_2, CH_4, and N_2O the Electricity Emission Factors are 0.72412, 0.0000302 and 0.0000081, respectively.

Carbon dioxide equivalent (CO_2e) generated from offsite sources in the production of electricity is much more difficult to mitigate; however, the state and the utility companies are taking steps to become more energy efficient and utilizing renewable non-carbon based energy sources. The goals of San Diego Gas and Electric (SDG&E), the proposed project's energy provider, are suggesting that 33 percent of the energy supplied to their customers would be from renewable sources. Under the BAU percentage reduction strategy of the GHG report, it is assumed that the utilities will increase renewable by up to 29 percent over the BAU starting period.

Furthermore, the U.S. EPA and the U.S. Department of Energy recommend building homes and habitable areas to achieve Energy Star compliance. Energy Star compliant homes are at least 15 percent more energy efficient than homes built to the 2004 International Residential Code (IRC), and by including additional energy-saving features, a 20-30 percent more energy efficient home as compared to a typical standard home is plausible.[2] These reduction methodologies could also be incorporated into commercial buildings (e.g., the daycare building) by utilizing the natural lighting, utilizing white roofs, and reducing heating and cooling requirements by providing good insulation in the buildings, although no commercial buildings are proposed as part of the Master Plan project.

These reduction measures work together with California's Energy Efficiency Standards for Residential and Nonresidential Buildings otherwise known as Title 24 standards. The latest Cal Green standards went into effect in 2011 and it is estimated that implementation of the standards which incorporate Energy Star compliance or other equivalent building efficiencies would produce at least a 20 percent reduction over BAU. However, for purposes of GHG calculations only a 20 percent total reduction were applied.

Natural Gas Usage

CO_2e generated from stationary combustion such as water heaters, stoves, pool heaters, and clothing dryers can be calculated for CO_2, CH_4, and N_2O utilizing equations III.8b within the CCARGRPV3.1 document as shown below:

Equation III.8b (GHG= CO_2, or CH_4, or N_2O)

$$GHG\ (metric\ tons) = \frac{Natural\ Gas\ Emission\ Factor\ (kg\ GHG/MMBtu) * Fuel\ Consumed\ (MMBtu)}{1{,}000\ kg/Metric\ Ton}$$

The natural gas emission factors are published within Table C.7 and C.8 in the CCARGRPV3.1. Natural gas emission factors for CO_2, CH_4, and N_2O are 53.06, 0.005 and 0.0001, respectively. These natural gas emission factors are inserted into equation III.8b and were published by CCARGRPV3.1.

Natural gas generation rates per residential dwelling unit were obtained from the SXCAQMD's CEQA Air Quality Handbook dated 1993.

[2] www.energystar.gov

Solid Waste Emissions

Solid waste generated from the proposed project will ultimately be discarded as trash and then deposited into a landfill. The decomposition of organic matter such as food, paper, yard trimmings and wood are anaerobically digested by bacteria which primarily produces GHGs as a by-product. However, organic decomposition occurs at different rates and is a function of the material content. The EPA published various emission rates with units of MTs of CO_2e per ton.[3]

Average waste generation mixes vary between land uses. However, CAPCOA has published data from CalRecycle by region which estimates 0.46 tons of trash per person is generated for multi-family developments within San Diego. Also, it is estimated that an average of 2.349 residents will occupy each dwelling unit. Therefore, the residential component of the project is expected to generate 814.98 tons per year.

The project traffic study indicates that the proposed daycare facility will generate 150 trips per day. The ITE Traffic Generation Manual indicates that a project of this size would generate roughly 28.3 trips per daycare employee which means the proposed daycare facility could have up to 5.3 employees or roughly six employees. Waste generation rates for daycare facilities isn't exactly clear; however, it was assumed that daycare facilities generate waste equivalent to Education Institutions which generate on average 0.12 tons/employee/year.[4] Therefore, using the unit of employees, the project would be expected to generate around 1.01 tons of waste per year. Given this it is expected that the overall project could produce 815.99 tons of waste each year.

Table 5.7-1 below identifies the typical mix ratio of waste by land use. Also, given that the project is primarily residential in nature all waste sources would be expected to be broken down by percentage as residential waste.

Table 5.7-1. Average Waste Breakdown and Emission Rates

Waste Type	Residential Waste Breakdown	Landfill Emission Factors (MT CO_2e per Ton)
Special Waste	1.50%	0.42
Mixed Residue	2.50%	0.04
Paper	19.60%	0.35
Glass	2.40%	0.04
Metal	4.00%	0.04
Electronics	0.70%	0.04
Plastic	9.20%	0.04
Other Organics	48.60%	0.24
Inert and Other	11.20%	0.04
Household Hazardous Waste (HHW)	0.30%	0.4

Source: California 2008 Statewide Waste Characterization Study – Cascadia Consulting Group 2009.

[3] Solid Waste management and Greenhouse Gases; A Life-Cycle Assessment of Emissions and Sinks.
[4] http://www.calrecycle.ca.gov/wastechar/WasteGenRates /Institution.htm

Water Use Emissions

Water used by the proposed project will indirectly utilize energy for preparation and conveyance of clean water to the project site. It is estimated that it takes 13,022 kilowatt hour (kWh)/million gallons (MG) of energy to deliver treated potable water which also includes the energy required to treat that water within a treatment facility.[5] Similarly it is estimated that potable water delivered for outdoor uses would only use 11,111 kWh/MG. Energy consumption for outdoor purposes would utilize less energy due to the fact that further treatment of the water is not required. Total energy consumption for all the land uses is then summed up to further calculate total emissions through the use of Equation III.6b as discussed above.

Water demand from the proposed project is expected to be as high as 180,900 GPD or 66,028,500 gallons annually[6]. The project applicant also estimates that the effluent generation for the proposed project would be as high as 149,600 GPD or 54,604,000 gallons annually.

Given both the potable demand and effluent generation, the entire project could require as much as 837,990.91 kWh of electricity per year. Also, San Diego Gas and Electric (SDG&E), the energy supplier for the water districts, will increase the source of renewable energy sources by an additional 29 percent which would decrease GHGs produced through the conveyance of water and have been considered within the water use calculations.

Wastewater Generation Emissions

An additional component of GHGs comes from project generated wastewater. The waste then is broken down by bacteria creating CH_4 and nitrogen oxides (NO_x). The aforementioned CAPCOA report on greenhouse gas mitigation estimates that the CH_4 created from project generated wastewater at the municipal treatment plant would produce 2.02 x 10-6 times the volume of wastewater in liters of CO_2e in metric tons.

5.7.3.2 Environmental Impacts

Project Construction Emissions

Grading of the proposed project will disturb roughly 74 acres of the 160-acre project site and would consist of clearing/grubbing, mass and finish grading and the grading duration would be expected to last approximately five months. As part of that work, the project engineer also expects that blasting operations will be necessary. The blasting operations would occur over a 10-day period with seven days of rock drilling and three days of blasting. Grading operations will occur simultaneously. It is expected that the balanced earthwork quantities will be 582,000 cubic yards (CY) with 27,000 CY developed from blasting.

After grading is complete, trenching operations would be started for wet and dry utilities and would last approximately 225 working days following with the commencement of building construction which would begin a three-year process of building out the remainder of the proposed development.

Three (3) separate blasts are expected to be performed as part of project grading, which would include all the drilling necessary to place approximately 8,000-10,000 pounds (lbs) of Ammonium Nitrate. It is expected that drilling would occur for seven days, which would be followed by 3 days of blasting. This operation would be expected during mass grading operations. For ammonium nitrate and fuel oil (ANFO)

[5] CAPCOA – Quantifying Greenhouse Gas Mitigation Measures-8/10
[6] Water Supply Assessment and Verification Report for Quarry Creek Project. March 26, 2012

mixtures it is expected that carbon monoxide would be generated in quantities of 67 lbs per every ton of explosives and nitrogen oxides would be generated at 17 lbs per the same quantity.[7]

Approximately 5 tons of explosives are expected to be used for three days, which would add an additional 156.78 lbs per day or 470.34 lbs total of NO_x. In terms of CO_2e, multiplying 470.34 lbs by 310 yields 145,805.4 lbs or 72.90 tons or 65.09 MTs of CO_2e. Combining this with the expected construction emissions of 6,159.32 MTs as calculated by URBEMIS brings the construction CO_2e emissions to 6,224.41 MTs. Given the fact that the total emissions will ultimately contribute to 2020 cumulative levels, it is acceptable to average the total construction emission over a 30-year period (SCAQMD 2008). A summary of the construction emissions is shown in Table 5.7-2.

Table 5.7-2. Construction GHG Emissions Summary

Year	CO_2
Construction Total (2013-2020)	6,224.41 (includes blasting)
Yearly Average (2020)*	207.48 tons/year over 30 years
Yearly Average MTs (2020)*	188.25 MTs/year over 30 years

Source: Global Climate Change Study 2012
Note: Data is rounded to the nearest decimal point.
Expected Construction emissions are based upon URBEMIS modeling assumptions identified methodology.
* Total Construction related CO2 averaged over a 30-year span.

Project-Related Operation Vehicular Emissions

Based on the traffic analysis of the proposed project, the project could add as many as 5,578 daily trips (not accounting for transit reductions) once the project is fully built-out which is anticipated in the year 2018. The average trip distance for the project as a whole is 8.54 miles. Based on this, the project would add approximately 47,634 VMT per day or approximately 165,292,280 miles per year. In order to obtain a realistic approximation of the BAU baseline emissions, the EMFAC 2007 model for 2020 was ran, which could be assumed to be BAU. The EMFAC modeling results are provided in the Global Climate Change Study in Appendix K of this EIR.

Project-Related Electricity Use

Based upon the California Statewide Residential Appliance Saturation Study (2004) prepared for the California Energy Commission (CEC) the average electricity usage for a dwelling unit per year is 5,941 kWh and the daycare facility is expected to demand energy similarly to that of an elementary school, which is estimated by SCAQMD to require 5.9KWh/SF/year. Therefore, the entire project would be expected to use 7,772,230 kWh annually. The equivalent CO_2 emissions are calculated in Table 5.7-3 below.

[7] EPA-AP 42, Fifth Edition Compilation of Air Pollutant Emission Factors-www.epa.gov/ttn/chief/ap42/ch13/final/c13s03.pdf

Table 5.7-3. Total GHG Emission Factors – Electricity Usage

GHG	Emission Factor eGRID Subregion WECC California (lbs/kWh)	Energy Usage (kWh)	Conversion (lbs/metric ton)	Total (metric tons)	GWP	CO_2e (metric tons)
CO_2	0.72412	3,909,096.0	2,204.62	1,283.97	1	1,283.96
CH_4	0.00003	3,909,096.0	2,204.62	0.054	21	1.12
N_2O	8.1E-06	3,909,096.0	2,204.62	0.014	310	4.45
Total						1,289.54

Source: Global Climate Change Study 2012
Note: Data is rounded to the nearest decimal point.

Project-Related Natural Gas Usage

Based upon SCAQMD's CEQA Air Quality Handbook (1993) the average natural gas usage for a single-family residential unit is 6,665 cubic feet (CF)/unit/month and a multi-family unit is 4,011.5 CF/unit/month. In order to be conservative 119 units were assumed to be single-family homes to account for larger units (e.g. 3 bedroom units). Therefore, the 119-unit single-family units would be expected to use 793,135 CF per month, while the 537 multi-family units would use 2,154,175.5 CF per month. Estimates for the daycare facility are expected to demand less than but similar to that of a hotel which would demand as much a 4.8 CF/SF/month for a total of 9,600 CF per month. The project would therefore demand 35,482,926 CF per year. Additionally, since one million metric British thermal units (MMBtu) is commonly equated to 1,000 CF of gas, the project would consume 34,482.93 MMBtu of natural gas per year. The equivalent CO_2 emissions are expected to be 2,939.17 MTs per year as shown in Table 5.7-4 below.

Table 5.7-4. Total GHG Emission Factors – Natural Gas Usage

GHG	Emission Factor (kg/MMBtu)	Natural Gas Usage (MMBtu)	Conversion (metric ton/kg)	Total (metric tons)	GWP	CO_2e (metric tons)
CO_2	53.06	35,482.93	0.001	1,882.724	1	1,882.72
CH_4	0.0050	35,482.93	0.001	0.177	21	3.73
N_2O	0.00010	35,482.93	0.001	0.004	310	1.1
Total						1,887.55

Source: Global Climate Change Study 2012.
Note: Data is rounded to the nearest decimal point.

Project-Related Solid Waste Emissions

Based upon methods discussed above, it was determined that the overall project could generate 815.99 tons of solid waste each year. Utilizing the EPA's waste breakdown emission factors for each trash type and multiplying those factors with the projected waste generation yields estimates for equivalent CO_2 of 166.98 MTs for the proposed project as shown in Table 5.7-5 below.

Table 5.7-5. Total GHG Emissions Factors – Solid Waste

Waste Type	Residential Waste Breakdown	Residential Waste (tons)	Commercial Waste Breakdown	Commercial Waste (tons)	Landfill Emission Factors ($MTCO_2e$ per ton)	Residential $MTCO_2e$	Commercial $MTCO_2e$
Special Waste	1.50%	12.22	9.30%	0.094	0.42	5.13	0.039
Mixed Residue	2.50%	20.37	0.10%	0.001	0.04	0.81	0
Paper	19.60%	159.74	5.50%	0.056	0.35	55.91	0.019
Glass	2.40%	19.56	0.50%	0.005	0.04	0.78	0
Metal	4.00%	32.60	5.60%	0.057	0.04	1.30	0.002
Electronics	0.70%	5.70	0.40%	0.004	0.04	0.23	0
Plastic	9.20%	74.98	5.80%	0.059	0.04	3.00	0.002
Other Organics	48.60%	396.08	13.60%	0.137	0.24	95.06	0.033
Inert and Other	11.20%	91.28	58.80%	0.594	0.04	3.65	0.024
HHW	0.30%	2.44	0.40%	0.004	0.40	0.98	0.002
Total $MTCO_2e$						166.86	0.12
Combined Total $MTCO_2e$						166.98	

Source: Global Climate Change Study 2012.
Note: Data is rounded to the nearest decimal point.

Project-Related Water Usage

Based on methods identified above, the proposed project would most likely require 75,048,376.80 gallons of water per year which could require as much as 837,990.91 kWh of energy usage. Given this, the project is expected to create approximately 276.44 MTs of CO_2e per year as shown in Table 5.7-6. This includes energy required to process the waste given the rates from CAPCOA. The proposed project was assumed to generate an equal level of wastewater as a worst-case assessment. However, water used for landscaping would not enter the sanitary sewers which would ultimately mean GHGs produced by wastewater will be lower than estimated in Table 5.7-6.

Table 5.7-6. Total GHG Emissions Factors – Electricity from Water Usage

GHG	Emission Factor eGRID Subregion WECC California (lbs/kWh)	Energy Usage (kWh)	Conversion (lbs/metric ton)	Total (metric tons)	GWP	CO_2e (metric tons)
CO_2	0.72412	837,990.91	2,204.62	275.24289	1	275.24289
CH_4	0.000030	837,990.91	2,204.62	0.01148	21	0.24106
N_2O	0.0000081	837,990.91	2,204.62	0.00308	310	0.95445
Total						276.44

Source: Global Climate Change Study 2012
Note: Data is rounded to the nearest decimal point.

Wastewater Generation Emission Calculation Methodology

Based on methods identified above, the project could generate 54.604 million gallons or 206,698,625 liters of waste water each year. Utilizing CAPCOA's baseline CO_2e approximation, it is estimated that the project would produce 417.53 MT CO_2e. It's likely that the offsite wastewater treatment plant will burn off the methane produced by the project which will reduce offsite emissions further. For purposes of this analysis and to be conservative, those offsite reductions were not considered.

Project Totals

Cumulatively, the full buildout of the project would result in emitting approximately 11,118.12 MTs of CO_2e each year. A summary of the totals is provided in Table 5.7-7. Per guidelines of CAPCOA's 900 MT per year threshold, the project would result in a significant impact. Implementation of Mitigation Measure GHG-1 would ensure that the project GHG emission reductions as presented in Table 5.7-8 and detailed below are met, and therefore, the impact would be mitigated to a level less than significant.

Table 5.7-7. CO_2e Emissions Summary

CO_2e Generator	CO_2e (metric tons)
Construction	188.25
Vehicular Usage	6,891.95
Electricity Usage	1,289.54
Natural Gas Usage	1,887.55
Solid Waste Emissions	166.86
Water Usage Emissions	276.44
Wastewater Emissions	417.53
Project Totals (business as usual)	11,118.12

Source: Global Climate Change Study 2012
Note: Data is rounded to the nearest decimal point.
Expected Construction emissions are based upon URBEMIS modeling assumptions identified methodology.
* Total Construction related CO2 averaged over a 30-year span.

Emission Reductions per Regulations

Vehicle Operations

California state regulations require vehicle manufactures to cut emissions of vehicles under Pavley rules. Vehicular emissions are expected to be reduced drastically through 2020. Based on reductions from Pavley, utilizing CARB recommended reduction measures, project related emissions would be expected to be reduced by up to 20 percent with Pavley standards alone. Additionally, Low Carbon Fuel Standards under Executive Order S-01-07 would be expected to reduce vehicle emissions by an additional 10 percent. Furthermore, by incorporating design features to reduce VMTs, such as installing sidewalks, bike lanes and incorporation of transit features and a park-and-ride lot, and given the proposed projects close vicinity to the nearby commercial uses and work amenities would reduce VMTs by 5-10 percent. Therefore, utilizing only a 5 percent VMT reduction, these emission reduction strategies would reduce CO_2e emissions by 2,412.18 MTs per year.

Table 5.7-8. Year 2020 Total GHG Emissions over BAU

Reduction Strategy	CO_2e Generator or Reduction Measure	CO_2e Reduction (metric tons)	Total BAU (metric tons)
BAU	Construction Related CO_2 - BAU		188.25
BAU	Offsite Vehicular CO_2e Emissions - BAU		6,891.95
Regulatory	CAFE and Pavley standards Combined (20%)	-1,378.39	
Regulatory	California Low Carbon Fuel Standard (10%)	-689.19	
Project Design	Sidewalks, Bike Paths, bus stop and Workability	-344.6	
BAU	Indirect Electricity Usage - BAU		1,289.54
Regulatory	Year 2020 Renewable Energy Generation by Utility (29%)	-373.97	
Project Design	Building Efficiencies and Cal Green for Electricity Usage	-257.91	
BAU	Natural Gas Usage - BAU		1,887.55
Project Design	Building Efficiencies and Cal Green for Natural Gas Usage	-377.51	
BAU	Solid Waste Generation - BAU		166.86
BAU	Water Usage - BAU		276.44
BAU	Wastewater CH_4		417.53
Regulatory	Year 2020 Renewable Energy Generation by Utility (29%)	-80.17	
Summation		*-3,501.73*	*11,118.12*
Combined Total		7,616.38	
Combined CO_2e Reduction (%)		31.50%	

Source: Global Climate Change Study 2012.
Note: Data is rounded to the nearest decimal point.

Indirect Electricity and Natural Gas Design Features

The proposed project is required to comply with Title 24 regulations. As a standard condition of approval, the City of Carlsbad will verify that the project design meets the EPA's energy star compliance guidelines or other equivalent building efficiencies based on the latest available technologies and implement Title 24 2008 requirements to achieve the 20 percent reductions over BAU with respect to only Title 24 2005 standards. Based upon the project's design features, it is expected that CO_2e could be reduced for both natural gas and electricity levels by as much as 635.42 $MTCO_2e$. To ensure that the homes meet Energy Star guidelines and reduce the GHG emissions as estimated, implementation of Mitigation Measure GHG-1is required. Implementation of Mitigation Measure GHG-1 will reduce the GHG emissions associated with the proposed project to a level less than significant.

Electrical Utility Reduction Measures

The goals of SDG&E suggest that 33 percent of the energy supplied to their customers would be from renewable sources by 2020. However, under the BAU percentage reduction strategy of this analysis, it is assumed that the utilities will increase renewable sources an additional 29 percent over the BAU starting period. Therefore, the project GHG emissions related to electricity usage would drop by as much as 373.97 $MTCO_2e$.[8]

[8] http://www.sdge.com/documents/aboutus/RegionalEnergyPlan.pdf

Additionally, it should be noted that water conveyance is primarily through the use of electricity. Therefore, emissions generated from water conveyance would also be expected to decrease by an additional 29 percent in 2020 which would drop the overall project related emissions from water conveyance by 80.17 $MTCO_2e$ for a total reduction of 454.13 $MTCO_2e$.

Conclusion

Combining all regulatory measures such as the Pavley, Low Carbon Fuel Standards and both the EPA Energy Star compliance standards and Cal Green standards, incorporation of project design features such as sidewalks and bike paths, in addition to implementation of Mitigation Measure GHG-1, CO_2e emissions would be expected to be reduced by 3,501.73 MTs compared to business as usual. A reduction of this size would reduce the projects emissions from business as usual by 31.50 percent which will meet and exceed the requirements of CEQA, and emissions would be less than significant. Therefore, the project conforms to the goals of AB 32 and direct impacts and cumulative impacts would be reduced to a level that is less than significant. Table 5.7-8 summarizes these reductions and identifies if the reduction is from regulatory measures or from project specific reductions.

Offsite Improvements

Implementation of the proposed project will require construction of several offsite improvements as described in EIR Section 3.0. These improvements include the construction of sewer lines/connections, water and reclaimed water lines/connections, trailheads, roadway improvements, and off-site grading. Construction of the offsite improvements would result in GHG emissions. However, offsite improvement construction would occur in simultaneously with project construction and have been considered as part of the GHG emissions calculation for the proposed project construction activities. A summary of the construction emissions is shown in Table 5.7-2 above and have been determined to be less than significant. The offsite improvements would not result in operational GHG emissions.

5.7.4 Level of Significance Before Mitigation

Cumulatively, the project will emit approximately 11,118.12 MTs of CO_2e each year. Per guidelines of CAPCOA's 900 MT per year threshold, the project would result in a significant impact.

5.7.5 Environmental Mitigation Measures

GHG-1 Prior to issuance of a building permit, third-party verification by a certified Home Energy Rater (or equivalent) shall be conducted on the proposed residential design components. The Rater shall work with the project proponent/builder throughout the construction process to help determine the needed energy–saving equipment and construction techniques; and will conduct required on–site diagnostic testing and inspections to document that the home is eligible to earn the Energy Star label or provide documentation demonstrating that a comparable level of energy reduction will be provided via alternative verifiable means. Additionally, residential buildings shall provide a space for recharge of batteries for both small (handheld) and large (e.g., electric lawnmower or car) equipment (laundry rooms and garages).

5.7.6 Level of Significance After Mitigation

As stated previously, Combining all regulatory measures such as the Pavley, Low Carbon Fuel Standards and both the EPA Energy Star compliance or equivalent standards and Cal Green standards, incorporation of project design features such as sidewalks and bike paths, in addition to implementation of Mitigation Measure GHG-1, CO_2e emissions would be expected to be reduced by 3,501.73 MTs compared to business as usual. A reduction of this size would reduce the projects emissions from business as usual by 30.67 percent which will meet and exceed the requirements of CEQA, and GHG emissions from the project would not exceed the significance threshold. Therefore, the project conforms to the goals of AB 32 and direct and cumulative impacts would be reduced to a level that is less than significant.